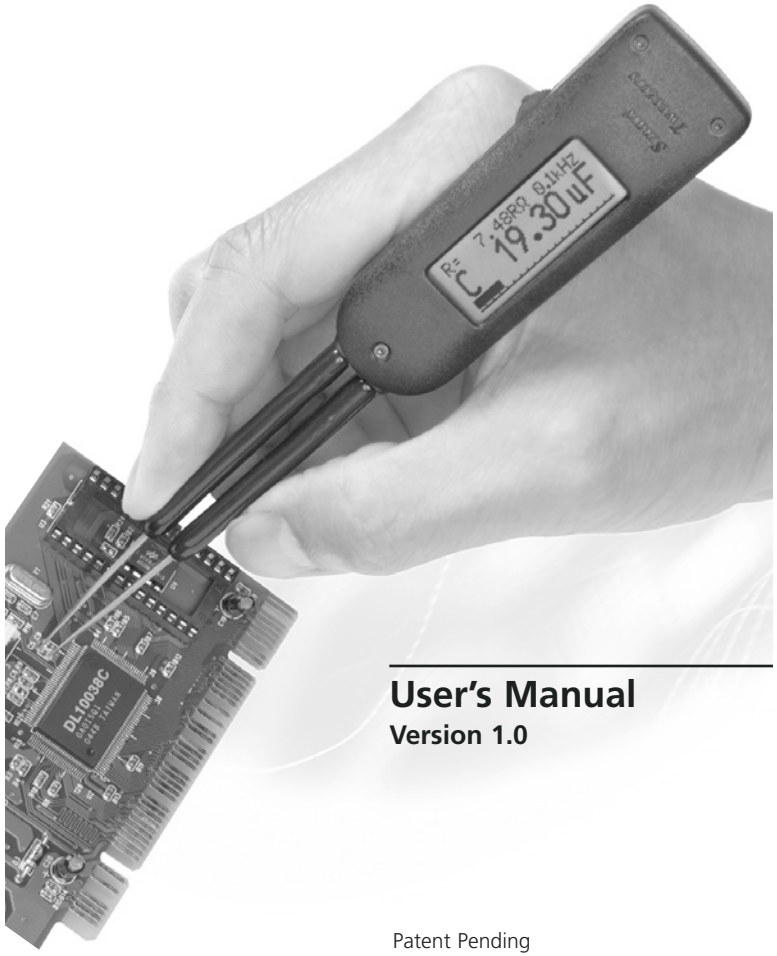
EXCELTA®
CORPORATION

SMART TWEEZERS

Model ST-1



User's Manual

Version 1.0

Patent Pending

Notice
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SAFETY INFORMATION

Warnings

- Inspect the Smart Tweezers case before using. Look for cracks and any damage. Do not use the device if it appears to be damaged.
- Do not use the device if it operates abnormally.
- Do not attempt to measure any components in-circuit when your circuit is under the power.

Cautions

To avoid possible damage to Smart Tweezers or to the equipment under test, follow these guidelines:

- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, inductance, or capacitance.
- Do not measure voltages more than 800 mV when in automatic mode.
- Use proper terminals and functions for your measurements.
- Use the correct batteries to power Smart Tweezers.

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OVERVIEW

Smart Tweezers is an R-L-C meter in a set of tweezers. Smart Tweezers is designed for production line component evaluation, on board impedance testing, and SMD components sorting. With automatic recognition of measurement mode (R, L and C) Smart Tweezers is ideal for identifying surface mounted devices.

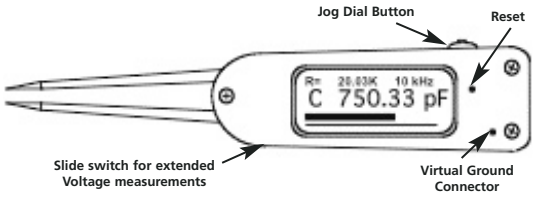


Figure 1.

Smart Tweezers has a unique mechanical and electronic design that incorporates a built-in direct precision SMD probe designed for component evaluation on the production line, PCB debugging, component impedance testing and sorting SMD components.

The integrated SMD probe and graphic display, combined with automatic recognition of measurement modes (R, C, and L) and the range of measurement, allows the operator focus on the component under test. As a result testing, sorting and evaluation of components becomes more efficient and cost effective.

QUICK REFERENCE

Display Area

Smart Tweezers has two display modes, Primary and Secondary.

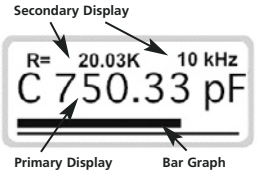


Figure 2.

Primary Display

The Primary Display is located in the middle of the display and is the larger of the two displays available. It shows the present reading. For most functions the primary display shows 5 digits.

If **OUT OF RANGE** is displayed an overload condition is present.

Secondary Display

The Secondary Display is located at the top of the display and is the smaller of the two displays. It shows the present reading of additional parameters, or measurement conditions when the primary display shows some other feature (*e.g.* L, C).

When multiple features are present, secondary display shows one of the values. For example, ESR value can appear in the secondary display while capacitor value appears in the primary display.

Bar Graph

The bar graph provides an analog indication of the measured input and is located at the bottom of the display.

The Jog Dial Button

The Jog Dial button (Figure. 3) is used to choose the selected function or to change a setting.

To change the menu displayed press and move the button left or right.

To select or execute a function press the button down (Figure 3).

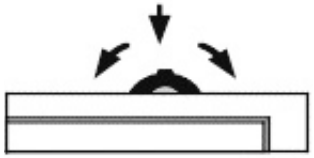


Figure 3.

Reset Button

The reset button resets the unit. This may need to be pressed after changing the batteries.

Virtual Ground

Use the Virtual Ground connector when performing in-circuit measurements to eliminate the influence of grounded components. Connect this point to the circuit Ground.

Important: Do NOT use the virtual ground when the tested circuit is under power.

Slide Switch

The slide switch can optionally be used to measure DC voltage up to 8V by enabling a 1/10 voltage divider.

Important: The slide switch should be turned off once the voltage measurement is completed. If it is not turned off incorrect results in automatic mode may occur. The slide switch is not an automatic control option.

USING SMART TWEEZERS

Turning Smart Tweezers ON

To turn the Smart Tweezers ON, press the jog dial button to any position.

The sign in the low left corner of the display indicates that device is ON and ready to perform measurements. **A, R, L** or **C** indicate auto, resistance, inductance and capacitance respectively.

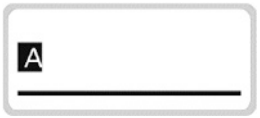


Figure 4.

Automatic Power Off

The unit will automatically power off, the display goes blank and the device goes into a "sleep" mode if no component has been touched or button pressed for approximately 30 seconds. You can set power off interval by change TIMEOUT setting in DISPLAY menu.

Pressing the Jog Dial button turns Smart Tweezers back on and the device then returns to the display for the previously selected function.

Automatic power off does not occur when the device is in **VOLTAGE**, **TRACE** or **MENU** mode.

Battery

Smart Tweezers uses three 1.5V alkaline or air zinc "button" type batteries, size 11.2 x 5.6mm (Type 357A or LR44).

Low Battery Indication

The **Low Battery** message and battery icon in the display is the notification that the batteries are low and should be replaced (Fig. 5). The warning appears when the batteries are about 90% depleted. The unit is still operational for a short time, however the batteries should be replaced as soon as possible.

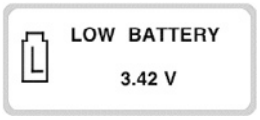


Figure 5.

MENU STRUCTURE

From the main menu it is possible to set the Smart Tweezers back to their default setting (AUTOSET) or go to SYSTEM or MEASURE menus (Fig. 6).

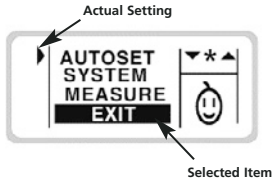


Figure 6.

Changing from the Default Setting

The user can change the default operating configuration of Smart Tweezers by changing the options. All setup options affect general operations and are active in all functions.

Smart Tweezers factory setting	
Frequency:	**AUTO range** Meter automatically selects frequency for the best accuracy.
Measurement:	**AUTO range** Meter automatically selects R, C or L measurement.
Period:	1s
Sound:	OFF
Display:	RIGHT
Timeout:	30 seconds

To enter SETUP mode turn on the device and go to **MAIN** menu.

SYSTEM Setting Menu

Use **SYSTEM** menu to set up system parameters for all functions (Fig. 7).

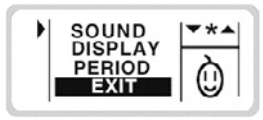


Figure 7.

SOUND Menu

Use the SOUND setting to turn the beeper **ON** or **OFF** as shown in Fig. 8.

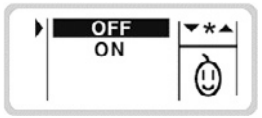
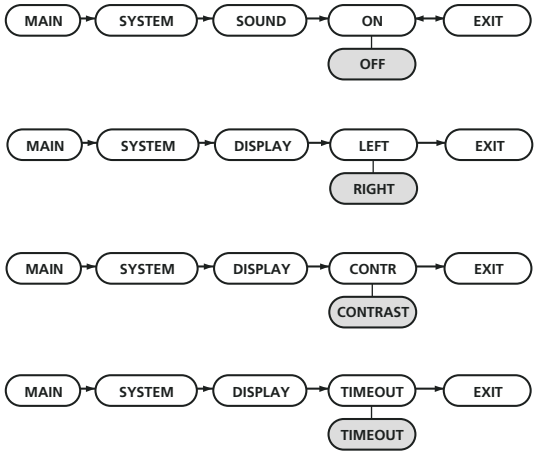


Figure 8.

DISPLAY orientation, contrast, timeout setting

Use the DISPLAY setting to change the display orientation, the contrast and the timeout as shown in Fig. 9.



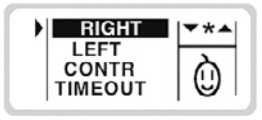
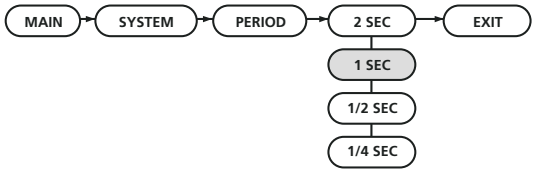


Figure 9.

Setting testing PERIOD

Use **PERIOD** to change the reading period setting as shown in Fig. 10.



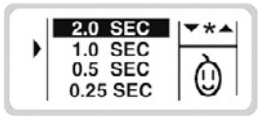


Figure 10.

Returning to Factory Defaults

Smart Tweezers comes with the setup options preset at the factory.

To return to these settings:

1. Go to the **MAIN** menu.
2. Set **AUTOSET**.
3. Set **EXIT** and all factory settings are restored.

Saving Setup Options

Choose **EXIT** to save the last option from the current menu. This option is marked by the arrow symbol. Choose **EXIT** to exit from the main menu.

MEASUREMENTS

The default setting is to perform fully automatic auto range measurement for resistance, inductance and capacitance.

Most measurement functions also have a manual mode, which can be selected by using the jog dial button. Use the manual setting when you need to measure a specific parameter or need better accuracy.

MEASUREMENT setting menu

To measure specific components or to change measurement parameters, use Measure menu as shown in (Fig. 11).

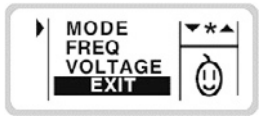


Figure 11.

Measuring Resistance, Inductance or Capacitance

For automatic measurement use AUTO setting (default). To measure **only one parameter** – resistance, inductance or capacitance set Smart Tweezers as shown in Fig. 12.

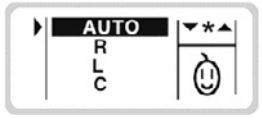
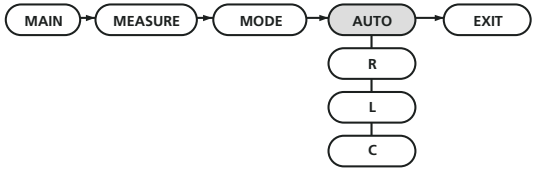


Figure 12.



Note: *When measuring small resistance, capacitance or inductance, make sure that terminals are clean.*

Test Frequency Setting

For automatic measurement use **AUTO** setting (default). Use fixed test frequency for specific measurements, such as very small or very large capacitance (less than 50pf or more than 100uF) or inductance.

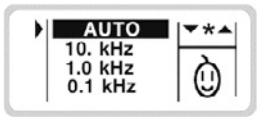
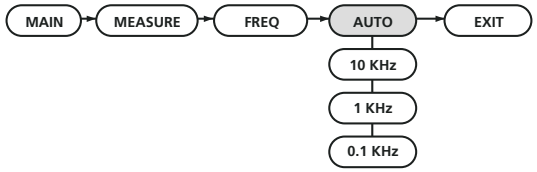


Figure 13.

To fix test frequency set Smart Tweezers as shown in Fig. 13.



Measuring Voltage

Use AUTO mode (default) to measure DC Voltage from 100uV to 800mV (up to 8V with slide switch manual setting). To measure voltages configure Smart Tweezers as shown in Fig. 14.

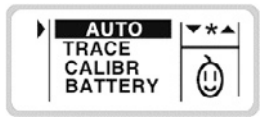
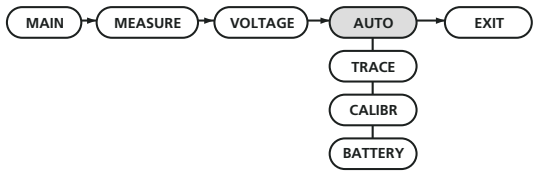


Figure 14.



Use AUTO mode (default) to measure DC Voltage from 100uV to 800mV.

Figure 15.

Use **TRACE** mode if you want to see the oscilloscope like picture of Voltage as shown in (Fig. 16).

To change speed turn jog dial button LEFT or RIGHT. To EXIT press the job dial button.

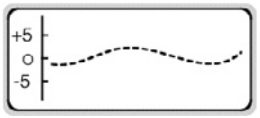


Figure 16.

Adjusting Voltage Offset

To adjust voltage offset:

1. Connect the probes to each other and choose **CALIBER** mode.
2. Press **EXIT** to exit calibration mode.
3. Disconnect probes.

Use BATTERY mode to measure current battery voltage. Press the jog dial button to exit.

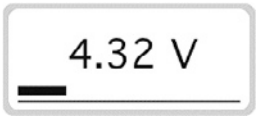


Figure 17.

MAINTENANCE

General Maintenance

Dirt or moisture in the terminals can affect measurement accuracy. Clean the terminals regularly. Do not use abrasives or solvents.

To clean the terminals:

1. Turn the device off.
2. Shake out any dirt that may be on the terminals.
3. Soak a new swab with alcohol. Work the swab around each terminal.

Replacing the Batteries

Replace the batteries with three alkaline or air-zinc batteries (LR44 or 375A type).

To replace the batteries:

1. Remove three screws with screwdriver TORX # 5 and lift the cover.
2. Replace the batteries follow the "+" and "–" sign.
3. Secure the cover.
4. Reset the device.

Troubleshooting

If there appears to be a malfunction during the operation of the device, the following steps should be performed in order to isolate the cause of the problem:

1. Check the battery.
2. Review the operating instructions for possible mistakes in operating procedure.

CAUTION: Except for replacing the battery, repair of the device should only be performed by an Authorized Service Center or by qualified device service personnel.

SPECIFICATIONS

Physical Specifications

Operating Temperature:	0 °C to + 55 °C
Storage Temperature:	40 °C to + 60 °C
Relative Humidity:	0 % to 90 % (0 °C to 35 °C) 0 % to 70 % (35 °C to 55 °C)
Altitude Operating:	0 – 2000 meters
Storage:	10000 meters
Battery Type:	1.5 V LR44 (357A) Alkaline or Air zinc
Battery Life:	80 Hours typical with alkaline, 220 hours with air zinc battery
Electromagnetic Compatibility (EMC):	Susceptibility and Emission: FCC 15 part B
Size:	14.0 x 2.5 x 3.0 cm (3.94 x 0.9 x 1.5 in)
Weight:	53 grams (0.11 lb)
Warranty:	1 year

Basic Specifications

Measured Parameters:	C, L, R, ESR, Rs, Rp
Measuring Frequencies:	100 Hz, 1 kHz, 10 kHz
Measurement rate:	1 time per second, default
DC Voltage:	0 to 800 mV (Up to 8 V with optional slide switch manual setting)
Resistance:	0.1 Ohm – 9 M Ohm 0.1 Ohm – 1 M Ohm
Resolution:	0.01 Ohm
Capacitance:	10 pF to 499 mF
Inductance:	1 uH to 999 mH
Battery life:	*minimum* 120 hrs (Air-Zinc batteries)

Detailed Accuracy Specifications

Accuracy is specified at 18 °C to 28 °C (64 °F to 82 °F), with relative humidity to 90 %.

Resistance	
Range:	0.1 Ohm – 5 MOhm
Accuracy:	1 % in range 0.1 R – 1 M 2 % in range 1 M – 5 M
Resolution:	0.01 R in range 0 – 10 R
Test Frequency:	1 kHz
Capacitance	
Range:	10 pF – 499 uF
Accuracy:	5 % in range 20 pF – 499 uF
Resolution:	0.5 pF in range 1 pF – 100 pF
Test Frequency:	1 kHz C > 1000 pF 10 kHz C < 1000 pF 100 Hz C > 1 uF
Inductance	
Range:	1 uH – 1 H
Accuracy:	10 % in range 1 uH – 10 uH 5 % in range 10 uH – 100 uH 5 % in range 100 uH – 1 H
Resolution:	0.5 uH in range 1 uH – 100 uH
Test Frequency:	10 kHz L < 1 uH 1 k Hz L > 1 uH 100 Hz L > 1 mH

Feature Summary

Graphics Displays. Analog Bar Graph. Fully automatic measurement of Inductance, Capacitance and Resistance. Auto range: Meter automatically selects best range. Trace Graph: Oscilloscope like display for voltage measurement.

LABELLING & VERIFICATION REQUIREMENTS

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1. this device may not cause harmful interference and
2. this device must accept any interference received,
including interference that may cause undesired operation.